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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/755,282	01/08/2001	Sheng-Hsiung Chen	TS99-149B	6859

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EXAMINER

MITCHELL, JAMES M

ART UNIT PAPER NUMBER

2827

DATE MAILED: 03/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/755,282

Applicant(s)

CHEN, SHENG-HSIUNG

Examiner

James M. Mitchell

Art Unit

2827

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 December 2003.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 34-39 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 34-39 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 08 January 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

1. Claims 34-39 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. Claim 34 contains subject matter, which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. There is no support in the specification for either: 1) a passivating layer formed over an interlocking grid array. Applicant's original disclosure, Specification Pages 12-14, indicates that the passivation layer forms **the interlocking grid array structure** and is over a copper layer/metallurgy (A. Spec. P. 12).

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claim 34-36 and 38 are rejected under 35 U.S.C. 102(b) as being anticipated by Shiue et al (U.S 5,923,088).

4. Shiue (Fig 3, 4) discloses a bond pad structure comprising a semiconductor substrate (Col. 1, Lines 19,37-39) comprising an interlocking grid structures (48; Col. 2, Line 6) formed over said substrate, a silicon oxide passivating layer (52; Col4, Lines 59-61) formed over said interlocking grid structures, a barrier layer ("TiN") formed over said passivating layer (via covering a portion of said passivating layer) and in said opening (via barrier on pad, 32; AlCu/TiN), a conductive bonding pad (30) formed of aluminum and copper (Col. 3, Lines 10-11) and over each said region and over said barrier layer (i.e. /TiN) whereby an upper surface of said conductive bond pad inherently provides improved adhesion (Col. 1, Lines 53-55) for subsequently formed bonds.

Claim Rejections - 35 USC § 103

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 37 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shiue as applied to claim 34.

7. Shiue further discloses from about 4 to 10 in number (36) and the size of the vias that form the interlocking grid array, but does not appear to disclose that the via is 100 by 100 microns square and that the size of the structures are about 10 to 25 microns in width and approximately 4 microns in height.

8. Although Shiue does not appear to disclose the dimensional limitation of applicant, it would have been obvious to adjust the dimension, because various

dimensions of pads are known and used through the art to accommodate various bonds, which do not result in the pad performing differently.

9. In any case, it would have been an obvious matter of design choice bounded by well known manufacturing constraints and ascertainable by routine experimentation and optimization to choose these particular dimensions because applicant has not disclosed that the dimensions are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical, and it appears prima facie that the process would possess utility using another dimension. Indeed, it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, *In re Rose*, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); *In re Rinehart*, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); *In re Dailey*, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

10. Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shiue et al. (US 5,923,088) as applied to claim 34 and further in combination with Edelstein et al. (U.S 6,133,136).

11. Shiue discloses the same invention except that the barrier layer is TiN instead of TaN, Edelstein (Col. 3, Lines 45-47) shows that a barrier formed of TaN is an equivalent structure known in the art for TiN. Therefore, because these barrier structures are art recognized equivalents at the time the invention was made, one of ordinary skill in the art would have found it obvious to substitute TaN barrier for TiN.

Response to Arguments

12. Applicant's arguments with respect to claims have been considered but are moot in view of the new ground(s) of rejection. However, applicant's arguments are addressed in order to expedite prosecution of application.

13. Applicant disagrees with the Examiner's reference to "pages 12-14" as containing the Applicant's claimed invention specifications, and with lacking "support" for the Applicant's claimed invention for passivating layers, but does not appear to clearly explain its rationale. Applicant only cites that the original specifications were submitted as pages 18-24, and described the Applicant's claimed invention with layering in detailed. In response to the general notion that applicant's invention is not disclosed in its own specification, examiner respectively disagrees.

14. The original disclosure (p. 12) indicates that the embodiments of the invention are now presented, therefore examiner is unpersuaded that the invention is not described within those pages. Furthermore the same key features, such as the "interlocking grid structures formed by the patterning and etching of a passivation material," is in the pages indicated by applicant (page 20); any deletion or addition to the original disclosure that changes its scope, such as the interlocking grid structure being other than the patterned, etched passivation material would result in new matter.

15. Applicant argues that claims 34-36 are not anticipated by Shiue, by distinguishing that applicant's bonding pad barrier material is specified to be TaN, instead of TiN. Applicant's statement is moot, because TaN is not recited in claims 34-36.

16. Applicant further states that applicant's claimed invention structure, the size and

shape of the interlocking grid bond pad structures are different than those found in Shiue. The Examiner's references to Shiue's teachings and matching those with Shiue's structure seems to appear totally different than that of the Applicant's figures 1-4. For example, the reference to Shiue's Fig. 3, conductive bond pad (30) depicts a planar layer of Al and Cu.

17. Assuming that applicant is trying to distinguish the top surface of the pad in Figure 1 with that of Shiue, the point is moot because the broad claim language does not exclude a planar surface. As to the size and shape of the bond pad, applicant has failed to establish criticality in order to overcome examiner's prima facie case of obviousness. Absent criticality the courts have held that changes in size are not patentable. MPEP 2144.04

18. Applicant has attempted to distinguish Applicant's claimed invention from Shiue, indicating that in Applicant's claimed invention, in the specifications and in Claims 34 and 38, the claimed invention provides details of the conducting bond pad formed by the interlocking grid structure or array comprised of aluminum. However, examiner respectively disagrees. Claim 38 recites that the pad is formed of Aluminum, not the interconnecting grid structure and claim 34 recites that the pad is formed over the "interlocking grid structures."

19. In regards to applicant's argument that claim 35 and 36 specify a pure copper bond pad structure and claim 38 specify a pure aluminum pad, with a passivating layer structure selected from Silicon oxide, Silicon Nitride or polyimide, the pad is not so

limited, but also encompasses any pad comprising any percentage of copper or aluminum.

20. As for applicant's statement that Applicant's claimed invention Figures 1, 2, 3 and 4 are unique; and are not found in Shiue's Fig. 3, is irrelevant, because it is applicant's claim language that defines the invention not applicant's drawings. Shiue is within the scope of applicant's invention as claimed.

21. Applicant further says that the Shiue disclosure teaches that via plugs are formed, which are electrical contact vias, and fails to disclose or suggest an interlocking grid array, as an integral part of the bond pad structure, as claimed by the Applicant. However, applicant fails to specifically identify how Shiue does not disclose an interlocking grid array. Each via plug formed in the passivation layers/interlocking grid array is essential to completeness of the bond pad and therefore is integral with the structure, so examiner is unclear as to how interlocking grid is not disclosed as an integral part of pad.

22. As to applicant's argument that Edelstein bond pad structure does not show the Applicant's claimed interlocking grid structure, is unpersuasive, because it was not relied for that teaching, but only to show various barrier materials between AlCu and Cu for bond pads, which applicant admits are common practice in the Industry (Remarks filed 12/12/ 2003, P. 10).

23. Lastly applicant summarizes its position by stating that the prior references fail to disclose or suggest the Applicant's non-obvious structure of an interlocking grid structure or pattern: (a) as shown in the Applicant's claimed invention Figs. 1 through 5;

(b) the top surface of the grid directly interacts with the bonding metallurgy; (c) the interlocking grid pattern does not teach a structure of forming a conducting via, since via resistance would increase by this structure.

24. In response to applicant's last arguments: (a) examiner reiterates that it is the claim that defines applicant's invention and that efforts to distinguish the claimed invention by referencing figures 1-5 is unpersuasive; (b) there is no claim that the interlocking grid array interacts with bonding metallurgy, so the point is moot, but still would be disclosed in Shiue; and (c) neither conducting vias, nor via resistance is precluded from the claimed invention in addition p28 of applicant's specification readily discloses the use of conducting vias ("plugs").

Conclusion

25. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

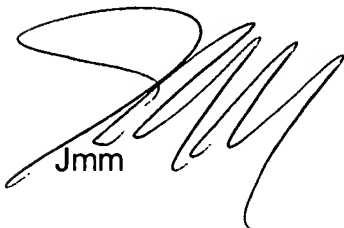
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to James M. Mitchell whose telephone number is (571) 272-1931. The examiner can normally be reached on M-F 6:30-3:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kamand Cuneo can be reached on (571) 272-1957. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



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